Title
"Stakeholders' influence in the successful development of Information Technology Office Buildings in India"

Synopsis of the Research Proposal

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Index

1. ABSTRACT 5

2. INTRODUCTION 6

2.1 THE IT REVOLUTION IN INDIA 6
2.2 CLASSIFICATION OF CONSTRUCTION PROJECTS 8
2.3 THE MULTIPLIER EFFECT 9
2.4 CONSTRUCTS USED IN THE STUDY 10
2.4.1 STAKEHOLDER, STAKEHOLDERS' FACTOR & STAKEHOLDERS' PERFORMANCE 11
2.4.2. CRITICAL SUCCESS & FAILURE FACTORS 12
2.4.3. PROJECT SUCCESS MEASURE 12

3. LITERATURE REVIEW 14

3.1 STAKEHOLDERS 15
3.2 CRITICAL SUCCESS & FAILURE FACTORS 18
3.2.1 CRITICAL FAILURE FACTORS 18
3.2.2 CRITICAL SUCCESS FACTORS 20
3.3 PROJECT SUCCESS 21
3.4 MAPPING THE LITERATURE REVIEW 23
3.5 RESEARCH GAPS 24

4. USE OF EXISTING THEORIES 25

4.1 STAKEHOLDERS THEORY 25
4.2 COMPLEXITY THEORY 25

5. SIGNIFICANCE AND RATIONALE OF THE RESEARCH 26

6. RESEARCH MODEL & FORMULATION OF HYPOTHESIS 30

6.1 OBJECTIVES OF THE PROPOSED RESEARCH 30
6.2 PROPOSED RESEARCH FRAMEWORK 30
6.3 DEFINING THE VARIABLES 32

7. RESEARCH METHODOLOGY 34

7.1 RESEARCH DESIGN 34
7.1.1 RESEARCH PHILOSOPHY 34
7.1.2 TYPE OF RESEARCH 34
7.2 RESEARCH QUESTIONNAIRE AND SAMPLING 35
7.3 SAMPLE SIZE & SOURCING 36
7.4 MEASUREMENT 37
7.5 DATA COLLECTION & ETHICAL CONSIDERATIONS 37

8. DATA ANALYSIS 39

9. LIMITATIONS AND DELIMITATIONS 42

10. THE WORK PLAN OF THE RESEARCH 43

11. REFERENCES 44

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1. Abstract

Information Technology Enabled Services (ITES) play a crucial role in the Indian economy through exports, employment and overall growth. India's share in global IT services (US$ 250 Bn) is estimated at around 55% for 2019-20 and is expected to grow from here. ITES companies operate from office buildings created with the ITES clientele in mind (ITOB). They are different from conventional multi-use office buildings from the perspectives of design, development and associated challenges. India has nearly 730 Mn SFT Grade A office space as of March 2022, and the ITES industry uses 72% of this space. So the study of ITOB is paramount, and not much research has been done on its development and the associated challenges.

A literature review was conducted through the Google scholar search engine, and forty-four papers were shortlisted. Additional eight papers were added based on relevance to the study. The study's findings were translated into a framework to understand the scope. Using the research gaps, the objectives for the proposed research were framed as (1) Understand the ITOB projects of India from the context of development, their stakeholders, and the stakeholders' factors, (2) Evaluate how the stakeholders' factors influence critical success & failure factors through their performance, (3) Understand the critical success and failure factors of ITOB projects in India and their relationship with project success and (4) Understand what success means in the development of ITOB in India and formulate stakeholder-based strategies to influence the outcome of the project. Seven Research Questions were framed using the findings of the Literature Review and the research gaps.

A framework has been conceptualised for the proposed research along with identifying the variables (One Independent Variable, Two Mediating Variables, One Moderating variable and One Dependent variable) and four Hypotheses for the testing. The proposed research is based on a post-positivist approach and a combination of Exploratory and Descriptive research. From the enquiry mode perspective, it is a combination of Qualitative and Quantitative research as the research not only intends to sum up various factors but will also attempt to establish the relationship between them.

Since there is no sampling frame available, non-probability judgement sampling will be used to identify the respondents for the survey. Before finalising the questionnaire, two expert panels will be formed to establish the difference between ITOB and commercial office buildings, success measures for ITOB projects, and to list the stakeholder factors influencing the success by using the current knowledge in the research domain. Using Cochran's formula and other similar studies, 150 respondents will be interviewed, and data will be collected using a five-point Likert scale. Path Least Square – Structural Equation Modelling (PLS-SEM) shall be used to analyse the data. PLS-SEM has been selected after evaluating its features and output and establishing that they meet the research objectives.

Five Limitation and Delimitations have been identified in the research plan. The research process shall commence on the 1st of October 2022 and be complete by the 30th of November 2024, including publishing research papers in 2023 and 2024. This research is relevant for ITOB projects in India as they provide the infrastructure for ITES, the economy's growth engine. This research is expected to benefit the developers to improve the overall success of developing ITOB projects in India.

2. Introduction

2.1 The IT revolution in India

Information Technology (IT) is the backbone of the modern industrial world. Most of the advancement of technology in manufacturing is based on the evolution in the IT sector. Robotic and flexible manufacturing systems augmenting productivity and efficiency were the highlight of the third Industrial Revolution. The fourth industrial revolution will be backed by communication technology and the Internet. Further, the growing service sector, supported by the revolution in communication technology and the internet, is making the countries' trade borderless. The globalisation and opening of borders by developing economies have resulted in the migration of productions and operations to cost-effective counties. Each country is positioning itself to specialise in a specific field based on its core competencies & competitiveness. The successful examples of China as the manufacturing base, Taiwan as the leader in the supply of electronic chips, and Singapore as a transhipment port are all based on their inherent strengths and the global requirements in these fields. In all of these, Information Technology and its Enabled Services (ITES) are poised to play a vital role as they are the foundation & building block of every sector in the 21st Century, whether it is communication, entertainment, governance, social interaction, banking & finance, international trade and manufacturing.

India rightfully placed itself as the global supplier of ITES. Per the Real Estate Industry Report of India Brand Equity Foundation (IBEF) published in July 2022[a], India plays a significant role in the services outsourcing business and contributed approximately 55% of the US$ 250 Bn global market as of 2019-20. For the year 2021-22, the Indian IT industry revenue touched US$227 Bn with 15.5% year-on-year growth, and exports contributed about US$ 149 Bn. It employs approximately 5 million young adults, which is bound to grow from here, as India is leveraging its strength of the young working population. As per the CBRE research report, the median age in India will move from 27 years in 2019 to 31.4 years by 2030, which is far lower than countries like US and China, which are 40 years and 42 years, respectively. Further, over a million engineers pass out annually in India through institutions governed by the All India Council for Technical Education (AICTE)[b].

Providing ITES services to the global market by Indian companies or location of ITES operations by foreign entities in India require robust infrastructure. This is fulfilled by the commercial office buildings specially designed with a suitable ecosystem for the operations of such companies. There are multiple models in which the ITES service provider acquires space for operations. Either it could be (a) a standalone campus owned by an Indian IT company such as Infosys or Wipro, (b) a branch of a foreign entity registered in India with a particular focus on IT operations of its business such as Amazon, (c) the leasing of buildings/campuses by the service provider from real estate developers or REITs (d) locating a unit in a Special Economic Zones or (e) partial leasing of a particular portion of the buildings by these ITES service provider. For this research, all the above models of space acquisitions are evaluated together as one segment called Information Technology Office Buildings or ITOB.

On the supply side of infrastructure, as per JLL India research, India has approximately 732 Mn SFT of Grade A and another 370 Million Grade B office stock as of March 2022. Grade A offices are properties with large floor plates (depending on the submarket), high-quality internal and external finishes, warm-shell with air conditioning facilities, ample parking, etc. The Grade A stock is poised to grow to 1 Bn by 2026 and touch 1.2 bn by 2030[c]. ITES-based companies occupy approximately 72% of Grade A office stock.

The break-up of Grade A office by sectors and by cities are given in Table 1 below;

	Grade A		Grade B	
Indian Cities	In Mn SFT	% of total	In Mn SFT	% of total
Bengaluru	182.6	24.9%	50.5	14.0%
Mumbai	145.7	19.9%	105.9	29.3%
Delhi NCR	137.6	18.8%	43.3	12.0%
Hyderabad	95.2	13.0%	86.1	23.9%
Pune	74.9	10.2%	40.5	11.2%
Chennai	68.3	9.3%	20.2	5.6%
Kolkata	28.0	3.8%	14.4	4.0%
Total	732.3	100.0%	361.0	100.0%
Source: JLL Research, India				

Users	In Mn SFT	% of total
IT SEZ	186.8	25.5%
IT	335.5	45.8%
Non-IT*	209.7	28.6%
Total	732.0	100.0%
Source: JLL Research, India		

Table 1
*Non-IT tenants primarily include consultancy businesses, financial services, co-working, corporate offices of manufacturing, telecom, healthcare, etc.

Providing an excellent facility (office buildings with all the required facilities designed for ITES operations) is a prerequisite for ITES companies to locate. These new-age factories in high-rise buildings work 24 by 7 to service global requirements. So, the question is, are they unique and different from other typical commercial buildings, and if so, how?

No reliable literature differentiating the regular office building serving various types of customers and the office building with exclusive ITES operations exists. These differences will guide us to understand whether ITES operations-based office buildings are unique in their design, development, and operations and, consequently, the challenges.

Some of the uniqueness of ITES operations-based office buildings are;[d]

a) Size of the building and floor plate
b) High density (Square foot per employee) – Impact on vertical transportation, Airconditioning, etc.
c) Higher Power requirements and consequent increase in infrastructure to support
d) Requirement of Employees welfare facilities such as a food court, gymnasium, creche, shopping, etc., within the premises
e) Sustainability requirement & energy saving measures as required by an international clientele
f) Logistics for the movement of the high volume of people
g) Augmented utilities for special operations such as Data centres
h) Requirement of intelligent buildings as a prerequisite by an international clientele
i) Need for reliable communication, network, and data services
j) Built to suit the requirements of clientele based on their scope of operations
k) The stakeholders and the scope of their intervention & management in the development process
l) Availability of credible lenders and project financing options
m) Special Economic Zone operations (in many cases)
n) Time to market and resultant squeezed schedule for development

These unique requirements of ITOB make them different from a conventional office building in planning, design, execution, and operations and, consequently, the challenges in successful

development. This challenge could be unique only to the Indian context as the proportion of ITES use within Grade A office building is almost 72% of the total Grade A space created to date.

2.2 Classification of Construction Projects

As step one, it is essential to understand where the office building category belongs, which will help to formulate the scope of the Literature review on the development of ITOB. Much research work has been done in the fields of "Projects" and "Construction". However, these are much bigger concepts and cannot be generalised for every type of project [1]. As per PMI 2021[2], Project is "*A temporary endeavour undertaken to create a unique product, service, or result. The temporary nature of projects indicates a beginning and an end to the project work or a phase of the project work. Projects can stand alone or be part of a program or portfolio*". The focus has moved from delivery to the outcome, which essentially means the project's overall performance in terms of benefits and values rather than merely meeting certain goals. It is essential to classify projects more so from the project management perspective so that the scope of communication can be easily identified. In early 2000, they were classified based on the technology content versus the project management scope [3]. The newer studies classify projects based on the marketing perspective, approaches towards their management or the product. Construction is one of the nine types of projects based on its product output [1]. It can be concluded that projects generally represent activities with clearly defined starts and ends and do not necessarily represent construction alone. The concept of project management ranges from management of infrastructure development [4] or building construction [5], or an IT project for a clientele [6][2]. So, when the concept of "Project" is used to create constructs such as Project Performance, Project Stakeholder, or Project Management, the scope of such study becomes too vast.

Unless expressly stated, most of the research papers on "Construction" or "Construction Projects" encompass a combination of infrastructure, public utilities, residential and other types of construction, making them generic and broad in scope. Studies by various authors on stakeholder & their relationship [7] [8], Stakeholder management & Trust [9], Stakeholder influence [10] [11], Factors influencing cost overrun [12], Organisation culture & delay [13], Impact of construction delays [14] etc. do not differentiate between construction of infrastructure projects, residential and commercial buildings, which by nature & complexities are very different.

The success or failure of Construction Projects or their associated challenges varies as to each project and country [15]. They also vary as to the state of development of the country and other aspects like culture, advancement of technology etc. [16]. Developing countries face more significant issues or challenges than developed countries [16]. The complexity of construction projects results in greater uncertainty regarding the schedule and cost of the projects [7]. For example, Gebral et al. conclude that the complexity of educational buildings is very different from other types of building projects due to simplicity and homogeneity in schedule, budget, and methodology of construction [15]. The culture of the country does have an impact on the performance of the projects [13]. So, all these compel us to narrow down the research on Construction projects into which sector the concerned project falls.

There is no universally established classification of Construction Projects other than based on the attributes or what it takes to deliver them [1], [2]. So based on the information available in the Literature, the following classes of construction projects can be assumed: Infrastructure

projects and Real Estate Projects. Infrastructure projects are structures meant for the public's general welfare and consist of dams, bridges, roads, hospitals, transport, rail, airways, public schools, etc[e]. Real estate has multiple connotations. While traditionally, they are core and non-core [17], they necessarily comprise Industrial, Shopping, Office, Retail, Lodging, Logistics etc. [18]. As per the Real Estate Industry Report of IBEF[a], the Real Estate sector comprises five sub-sector viz Commercial, Hospitality, Retail, Housing and SEZ, which is the more prevalent usage in the Indian context. One element of Real Estate is commercial assets, and as explained in the earlier section, commercial assets consist of the office building as one of the classes of investments. Office buildings can be further categorised into Grade A, B, C and Office buildings for IT Usage and Not IT usage based on the research report of JLL India. The pictorial depiction of the hierarchy based on the above discussion is as under.

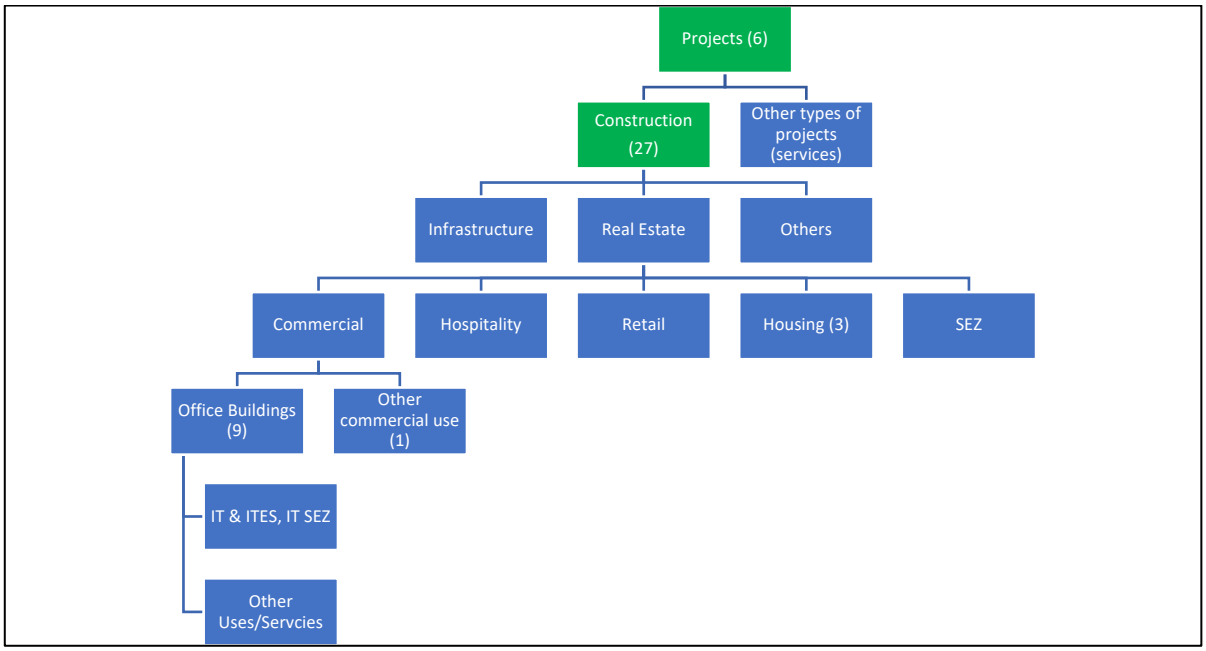


Table 2: Author's assessment of classification based on earlier research and publicly available data

In the above analysis, all four subcategories below “Construction” fall within "Construction Projects", and limited studies focus on specific subcategories, especially concerning their development and issues connected to the development of these projects.

2.3 The multiplier effect

No specific data is available concerning indirect benefits to the economy by developing office building projects or commercial real estate as sub-sectors of real estate, apart from the fact that they are the backbone of the ITES Industry's growth. So, evaluation has been done one level above, which is Real Estate as a sub-sector under Construction Projects.

In developing economies, Real Estate remains the most contributing industry in terms of employment generation & growth. India's residential and commercial real estate sector stands next to agriculture, providing employment and supporting over 250 ancillary industries such as steel and cement. It contributes approximately 6% of India's GDP and has posted around 20% year-on-year growth since 2010 [19].

As per the Real Estate Industry Report of IBEF[a], India's real estate market is estimated to reach US$ 1 trillion by 2030, up from US$ 200 billion in 2021. By 2025, 13% of the country's GDP will come from real estate. Retail, hospitality, and commercial real estate are also growing significantly, providing the much-needed infrastructure for India's growing needs.

Commercial real estate has a significant multiplier effect on any economy. Taking the example of the United States, as per the NAIOP Research Foundation, the total spending of approximately US$ 200 billion in commercial real estate development in 2018 contributed about US$ 600 billion to the GDP (including multiplier effect) and 4 million jobs (Fuller, 2019). In this evaluation, the commercial real estate has been limited to industrial, office, warehouse and retail and excludes residential, hotel and government buildings.

Geltner & Miller, in their book on Commercial Real Estate Analysis and Investment,[f] call this a Space Market which necessarily means a market for use/right to use either the land or built-up space (real assets) for some specific use, including residential and commercial purposes. It is highly segmented as the demand and supply of Commercial Real Estate are influenced mainly by the type of buildings and the location. While it is a local phenomenon from the supply side, it is increasingly becoming a global phenomenon from the demand side due to the constant search for cheaper sources of production and services, especially towards emerging economies and the opportunities provided by globalization [20]. At the same time, it is also one of the most high-risk industries due to diverse external factors such as the economy (inflation, interest rates, exchange rates etc.) and Government policies and regulations, including political stability [18].

As per the Real Estate Industry Report of IBEF[a], India attracted more than US$10 Bn in FDI in commercial real estate in the last four years (2017-21). For a developing economy like India, FDI plays a crucial role in the sector's growth. Annual delivery & absorption of commercial office space is expected to reach about 50 million SFT per annum by 2023 (40 MN SFT in 2021). This growth is backed by exponential growth in service sectors, including Information Technology, Banking, Financial services etc. There is a noticeable trend of demand accelerating from Tier I to Tier II cities and from Central Business District to Secondary Business District.

Given the significant direct and indirect contributions of the ITOB sector to the Indian economy, which is a subsector of Real Estate, it is very pertinent to understand the dynamics around the development of ITOB, their key stakeholders, and how they influence their successful development.

2.4 Constructs used in the study

The following constructs have been used for this research.

a. Stakeholders, Stakeholders' factors & Stakeholders' performance
b. Critical Success and Failure Factors (CSFF)
c. Project Success Measures (PSM)

Each of the above Constructs has been explained hereunder.

2.4.1 Stakeholder, Stakeholders' factor & Stakeholders' performance

As per R. Edward Freeman, the inventor of the Stakeholder Theory in 1984, "Stakeholder is any group or individual that can affect or be affected by the realization of an organization purpose"[21]. In the construction industry context, the specific entities associated with construction projects emerge as stakeholders. As per El-Sawalhi & Hammad [22], stakeholders in construction projects would include "the owners and users of facilities, project managers, facilities managers, designers, shareholders, legal authorities, employees, subcontractors, suppliers, process and service providers, competitors, banks, insurance companies, media, community representatives, neighbours, the general public, government establishments, visitors, customers, regional development agencies, the natural environment, pressure groups, civic institutions, etc.". It includes organisations and individuals associated with a project, as their involvement affects the project results positively or negatively [23]. So, applying the above concepts and definitions and various studies in the field of project management [24], stakeholders of the ITOB project can be safely concluded as,

(a) Owners (developers who invest capital and own the asset for income purposes),
(b) Consultants (designers of the project),
(c) Contractors (who execute the project, including sub-contractors),
(d) Clients & Users (who operate from the facility),
(e) Lenders & Investors (who finance the construction activities),
(f) Project Managers (who manage the construction at the site consisting of either the mid-level managers of the Owners or external agencies appointed for this purpose), and
(g) Government (Who provides the necessary approvals).

One of the reasons for project delays and cost overrun is the underestimation of stakeholders' influence on the construction project [25]. Delays in projects occur due to actions or inactions and the quality of decisions taken by key stakeholders such as clients (in this case, owners), designers or consultants and contractors[26]. In the case of the Nigerian construction industry, the Actions and Inaction of internal stakeholders contribute the maximum towards time and cost overrun [25]. In Rwanda's commercial building projects, a high positive correlation is seen between consultant (stakeholder) related factors and client satisfaction [24]. Stakeholder influence is seen as a necessary factor for a better outcome of the project. Thus Stakeholders play a significant role in formulating project strategies which help deliver the project successfully. In this context, the skill set of the project managers plays a vital role. These stakeholder factors, if appropriately managed, can become an enabler for success through information flow, decision making etc. [21]. Each stakeholder has a different level of stake and power within a project, and the outcome is subject to the actions and decision of these stakeholders; hence need to be managed well [27].

So for this research, stakeholder factors are assumed to be the actions under the influence of each stakeholder and have a direct and indirect impact on the project outcome.

What has been seen in the literature review is the performance of a stakeholder can be impacted by other stakeholder factors & their performance. The underlying essence of this is positive stakeholder relationships and coordination between them. Trust, respect, honesty and commitment are at the core of stakeholders' relationships [16]. The collaboration between the stakeholders, especially the owners, consultants and contractors, is critical in reducing the likelihood of any delays [27]. Due to inherent competition in the industry and the complexity of the works, sharing information and knowledge does not happen between the shareholders impacting the overall performance [7]. Within the spectrum of project execution, we can find

each stakeholder has diverse objectives and goals, which could create a conflicting situation impacting the performance [16]. While the project owner might blame a contractor for the delays due to poorer planning and coordination, the contractor might blame the owner for the design change during execution [24]. The change of design could be due to the scope gap emanating from the incorrect brief of the owner to the consultant, and the contractor suffers in the process for no reason. There is a constant pull and push between the owners and consultants on one side and the contractors on the other side, trying to evaluate who caused the time and cost overrun [15]. The project managers are stuck between both sides but can positively influence the coordination. What comes out of these is that a stakeholder's performance in a construction project is a function of stakeholders' relationship and coordination and is influenced by other stakeholders' factors.

We can safely conclude that stakeholder performance is the act of discharging the responsibilities of each stakeholder in the project delivery in the most efficient and successful manner, including their action/inaction towards the stakeholders' factors attributed to them, which are at times impacted by other stakeholders' performance. The end goal of stakeholder performance is coordination and collaboration, resulting in collective performance towards success measures.

2.4.2. Critical success & failure factors

Success and failure are two sides of the same coin. A project getting delayed does not necessarily mean failure, and a project completed within the budget does not necessarily imply success. The measures of success are very different due to the involvement of multiple stakeholders, as seen in the Sydney Opera House case [23]. Though the project was not executed within the budget and timeline (which means a failure under triple constraint) has got its name in the tourist map of Australia and thus generates regular income from the flow of visitors. The success of a project is evaluated post-completion, and the critical success & failure factors are at the door leading the way to project success evaluation. Some of the success factors noted in the literature are robust programming & scheduling, efficient management of resources, meeting the triple constraints of cost, time and quality [24], effective risk management, effective stakeholder collaboration and engagement, and meeting financial obligations [21], leadership, knowledge integration [23]. Similarly, some of the factors leading to the negative outcome on project success measures, as cited in the literature, are improper planning, outdated systems and processes [21], poor construction management, lack of coordinated efforts, failures during construction, and overlapping construction sequences [16].

So, critical success and failure factors are the outcome of stakeholders' collaborative performance and can collectively determine the project outcome based on their intensity.

2.4.3. Project Success Measure

Success as a concept and Project success as a construct has been widely researched. Traditionally, the famous "Iron Triangle", famously known as triple constraints proposed by Atkinson R (1999) consisting of Time, Cost and Scope or Quality, was considered the success evaluation criteria for a project. This used to be called "***two guesses and one phenomenon***"[27]. Various research done post that such as Cooke-Davies, 2002, Jugdev & Müller, 2005, Collyer & Warren, 2009, Shenhar & Dvir, 2007, Turner & Zolin, 2012, Thomas et al. 2008 have disagreed with the above and concluded that the scope of overall project success is much

broader and cannot be narrowed down to just the triple constraints[28]. A few other parameters got added by various researchers as this concept was thoroughly evaluated in different contexts, and these include meeting stakeholders' expectations [29], Stakeholder satisfaction [5], Client/ Customer satisfaction [28] etc. Researchers have separated the concept of success into project success and project management success [28]. Another competing measure over triple constraint is project efficiency, and the project's success is meeting the more critical goals set by the stakeholders [28]. As per the Triple-test performance framework' proposed by Zwikael and Smyrk (2012) [6], the dimensions of success are classified into project management success, project ownership success and project investment success. The reason is that each stakeholder's narrowed goals at a certain level are diverse, and they view success from their point of view.

For this research, the construct of the Project Success Measure is limited to project development success and collective achievement of goals by all the stakeholders, which is much broader in scope.

3. Literature review

A systematic Literature Review is a vital research methodology and an integral part of scientific research. It helps assimilate the existing body of knowledge, creates new knowledge, and directs us towards future research work. A limited literature review was undertaken around the constructs explained in the previous section. Google Scholar database was used as the search engine. Since the development of ITOB belongs to building construction activity, an advance search was undertaken using "Building construction" in the title of articles as the primary search with at least one of the words “success factors”, “performance indicators”, “stakeholder”, and “delay”. Since the terminologies of construction and projects are interchangeably used, another search was done using "Building projects" in the title of articles as the primary search with at least one of the words “success factors”, “performance indicators”, “stakeholder”, and “delay” excluding “Energy”. The search period was limited between 2017-2022. In all, 110 references were found, and after closer evaluation of the purpose of the papers, relevance, removing duplications, and the basis of open-source, forty-six papers were shortlisted. Apart from the above-another eight papers were included based on relevance and other aspects of research. Construct wise count is given hereunder;

Concepts / Constructs	No. of research papers
Stakeholders	21
Project Success	11
Critical success & failure Factors	14

Many papers were based on research conducted in a specific country, and there are limited papers that span globally or are specific to India. These papers were categorised as per the country where the data was sourced, as the success or failure of construction projects or the associated challenges varies for each project and each country [15].

Name of the country	**No. of papers**	Name of the country	**No. of papers**
Australia	1	Rwanda	1
Brazil	1	Spain	1
Croatia	1	Taiwan	1
Cyprus	1	Thailand	2
Egypt	1	Turkey	1
India	3	UAE	2
Iran	2	US	1
Indonesia	2	Vietnam	3
New Zealand	1	Yemen	1
Nigeria	1	Zambia	1
Pakistan	2	Universal*	16
			*11 of them are SLR

Further, there is limited research on commercial or office buildings concerning their developments and associated challenges, particularly in India, and there are no papers on ITOB

development and its related challenges. The classification of the papers based on the type of projects is given hereunder.

Project typology	No of papers
All types of projects beyond construction	6
All types of construction, including public projects	10
All types of construction projects	17
Educational building projects	1
Residential projects	3
Building projects	8
Commercial Building projects	1

For better evaluation, the literature review has been summarised under the three primary areas of research: stakeholders, critical success and failure factors and project success.

3.1 Stakeholders

As stated, stakeholders can impact or get impacted by the project's performance. Stakeholders are a group of people whom the owners assemble for the development of the project, and they have their own goals and objectives for their association with the project. So, coordination & alignment between stakeholders is essential for the success of any project. Given their critical role, it is necessary to identify them early in the project and understand their role in successful project development. Efforts should be made to realise their legitimacy in the project, their power, and the urgency they exhibit [30]. Identification of stakeholders, their classification and monitoring are considered a prescriptive form of stakeholders management. This is followed by their involvement and engagement, which is a relational form of stakeholder management [31]. The challenge shall always be to establish who the project stakeholders are. In the case study on the Spanish railway project [11], the ANP model was used as a tool to evaluate and identify the stakeholders by the project managers such that they shall be in a position to assess the influence of each of stakeholder on the project and devise suitable stakeholders' engagement strategy. There are studies distinguishing the stakeholders as internal and external and mapping the internal stakeholders at various levels of the organisation [32]. This study further attempts to explore the relationship between them. The key observation is that the stakeholder approach & application should commence at the organisational level, be operationalised at the portfolio level and be executed at the project level. This view of the stakeholder approach increases the scope of stakeholders beyond the project execution level and encompasses post project completion stage as well.

The nature and type of project determine the project's objectives incorporating the interest of stakeholders. Project managers constantly pursue to enhance them through strategies adopted from time to time such that the stakeholders and organisations are collectively benefitted from them. The project managers also need to balance the stakeholders' needs and expectations. The decision taken during project implementation needs to be balanced towards the stakeholders. This can be achieved by choosing the right attributes to be managed based on the various stages of construction. The core of all these is stakeholder management and their performance. Given the subjective manner in which the evaluation of the performance of the project is done, there is a need for an objective measurement tool for stakeholder management [33].

In the study on the finishing phase of high-rise buildings in Vietnam [16], 30 critical factors which lead to failures in the coordination performance between stakeholders were identified and evaluated. The key findings are, the importance of cooperative relationships amongst the stakeholders and how they impact the project's performance. The study also highlights how the actions/ inactions of the stakeholders affect the performance of the project. There are studies attributing the causes of delay to the stakeholders. The study on delay factors and claims in Jakarta residential building projects [34] found that 60% of the delays are caused by the owners and 30% by the contractors. However, there are other studies wherein causes of delays have been attributed to other stakeholders as well and are not limited to owners and contractors.

Moving to study on each of the stakeholders, the critical of all stakeholders is the owner, who has the lion's share in the project's outcome and has a significant influence on the outcome of the project due to his action and inaction. A study by Moryadee et al. [35] has identified factors attributable to owners, such as slow decision-making, change of design during the course of execution, delayed approvals and delayed payments etc., as critical factors having multiplier effects leading to project delays in Thailand high-rise building construction. Planning and effective communication have been highlighted as essential mitigating factors to avoid delays. Whereas Jelodar et al. [36] have narrowed down the research on the influence of contractors as the stakeholder in building projects in New Zealand and established the root causes of contractors' actions and inaction causing the delays, and have prescribed specific strategic measures to mitigate them. What comes out of their discussion is that these causes can be addressed strategically at the source, which is a critical focus of this study. Entrepreneurial orientation, viz strategic posture of the organisation too, can impact project success factors with a weightage of approximately 20% [37], and these are part of the project governance system set by the project owners. Project Managers as a stakeholder play a key role in stakeholders' engagement, alignment and management, eventually leading to a successful project outcome. As project managers, they need to acquire or be in possession of certain soft skills as they contribute significantly to project success factors. One of the critically required skills is conflict management between stakeholders, as they have the highest correlation with critical success factors of a project [38]. The inference of this finding is that stakeholder conflict is one of the challenges faced in projects, and it can be best resolved by effective stakeholder management. There are many other studies highlighting how the impact of action and inaction of other stakeholders, such as consultants, clients (users), government etc., impact the project's outcome.

The above studies establish that stakeholders largely contribute to the success/failures of building & construction projects. Having established that, it is pertinent to evaluate the importance of managing these stakeholders, which could positively impact the outcome of their performance, eventually leading to the successful completion of the projects. As per Olatunde et al. [25], good stakeholder relationships, timely constraint management and robust communication play a key role in the effective stakeholder management in Nigerian building projects. While there are 25 factors identified and grouped into six categories, maintaining good communication lies at the heart of all the factors influencing the stakeholders' management, even in private projects. At the same time, this has been the core of challenges in public projects. The study also reveals that the responsibility for good communication between the stakeholders lies with the project managers, who themselves are the stakeholders. The cooperation between shareholders will likely impact the project cost, duration and overall performance [7]. Good cooperation can be obtained by resolving conflicts of interest between the stakeholders, expectation management of the stakeholders, risk management, and finally, focusing on soft issues such as trust between the stakeholders [29]. The scope of stakeholder management is

believed to be also determined by the project environment and the resultant tools and techniques for managing the relationship, and this requires constant improvement [27]. The scope extends to assuming and discharging responsibilities under ethical, economic, environmental, and legal considerations [27]. So, there cannot be one size fit all solution for stakeholder management, and it needs to be determined based on the context and complexities of the project, which makes the scope of stakeholder management much wider.

Factors such as early collaboration between stakeholders, proper & periodical communication during the course of the project, and involvement of stakeholders in the decision-making process are expected to enhance the engagement of stakeholders during the project execution stage, which is considered one of the factors impacting project performance [21]. Any gaps in such engagement can be mitigated by having periodical meetings to resolve the issues. Transparency & expectation management are the key to improving overall stakeholder performance. Another exciting dimension in stakeholders' management is stakeholder satisfaction as the intervening or mediating factor between stakeholder management and project performance. There is a positive correlation between stakeholder management and project performance which is influenced by the construct called stakeholders satisfaction. Though the study by Abolghasemi et al. [5] is in the context of Iranian residential projects, the findings are relevant to stakeholder management for other types of projects.

Even though trust is a much broader concept and contextual in its meaning and interpretation, it plays a crucial role in achieving stakeholder satisfaction, eventually leading to project performance. Stakeholder management positively impacts the development of trust, and trust between stakeholders improves the stakeholders' collaboration and reduces conflicts [9]. Trust should be used as a tool in the stakeholder engagement process to bolster stakeholder management. It will improve the stakeholders' influence and help achieve stakeholder satisfaction, leading to better project outcomes. In this context, sharing information and communication is seen as an essential prerequisite to developing trust among the stakeholders. Using Hartman’s (2003) typology of Trust, Intuitive Trust is more relevant than integrity and competence, as this form exhibits empathy and demonstrates the project manager's interest in managing the needs and expectations of the other stakeholders. This is essential from the start till the end of the project for better stakeholder performance [31]. Another less researched dimension is risk management in construction projects and how stakeholder management can be effectively used. The risks vary as to each stakeholder, which means that the management of these risks can be better done by identifying the stakeholders in whose domain they exist, their role and their scope in managing these risks and how & how much they are aligned in managing these risks and overall impact of the same on project outcome. Risks are traditionally evaluated in the domains of the Iron Triangle and safety as added measures, and the management of these factors as an integral part of stakeholders’ management can mitigate the risks in the process [39]. To achieve better stakeholder management, the project environment is also considered necessary in deciding the strategies and tools to be adopted in managing the [27].

So based on the Literature review, it is concluded that the strength of the stakeholder relationship, its management, conflict or cooperation between the stakeholders, and their alignment with the overall goals lies at the centre of factors leading to project success. Much of the critical challenges in project execution emanate from stakeholders, and proactive strategies are required to reduce the risks associated with the project, eventually improving the project's overall success. Having said that, while there is a positive correlation between stakeholder

management and project outcomes, conclusive evidence of the same leading to project success must be established [27].

As mentioned earlier, the concept of project management in the earlier research is much more comprehensive in scope and includes the construction of different asset classes and infrastructures. What is not clear from the study is how much of these findings will apply to an ITOB as the challenges are unique and complexities are high. This leads us to the first research question.

RQ1: Given the criticality of ITOB for India, who are the stakeholders of an ITOB in the context of project success?

What is established in the above studies is that stakeholders' actions and inaction lead to critical success factors or critical failure factors, eventually leading to project success. Interconnected parameters create a series of events in succession, which ultimately leads to delay of the project, which is nothing but action & inaction of the stakeholders [26]. The owners, contractors, consultants, and project managers as stakeholders of construction projects are responsible for many of the factors leading to project success [35] [36] [38]. In reality, their action and inaction impact other stakeholders' performance, eventually leading to project success or failure. For example, if the owner is not paying the contractor on time, the contractor's performance is impacted, eventually leading to project delays; The project's consultant causes poor design or scope gap, which impacts the owners in terms of higher project cost than budgeted. This aspect of stakeholder action/inaction impacting other stakeholders' performance has never been researched. This leads us to the next set of research questions.

RQ2: What are the stakeholders' factors (action & inaction) that impact the stakeholder's performance, in their role towards the project's success?

RQ3: Are these stakeholders' factors dynamic in nature?

3.2 Critical Success & Failure Factors

Challenges & complexity in commercial building project development leads to delays resulting in poor quality, cost overruns, and, consequently, project failure and possible abandonment. In the Literature review, factors have been identified either as critical success factors [40] or critical failure factors [16]. Either way, both indicate and lead to the overall performance of the project in a way. Using Contingency Theory, Kate Davis [41]explains that there are internal and external factors to any project, and they do change over the project's life cycle. Successful project management should take cognisance of the factors, act upon them, and provide a framework for managing them. Performance areas is the term used for a project's critical success measures and is referred to as attributes, factors, KPIs or critical success factors by many other authors [42]. These factors impact the project outcome, and at the root of this, these factors are caused by one or more stakeholders directly or indirectly, as seen below.

3.2.1 Critical Failure Factors

Delays in project completion, an essential element of triple constraints (Atkinson, 1999) and a critical failure factor, is a critically discussed topic in the successful completion of the project. Developing countries have much more significant problems than developing countries. In the

case of Yemen, 40% of the projects were beyond the budget, and 47 % of the total projects did not complete on time [43]. While the definition of the project's success has expanded over the last three decades since the concept of the iron triangle was proposed, the delay has never lost its importance when evaluating a project's success in general.

Delay factors are those which cause the delay in the completion of the project. As per the study by Yvette Ingabire [24] on Rwanda commercial building projects, delays are caused by factors related to contractors, equipment, environment, design, project material, relationships and owners. The success of the development is indicated by the performance of cost, time, quality, client satisfaction, functionality and health and safety. High positive correlations were found between (a) consultant factors and owner's satisfaction, (b) equipment factors and performance of cost & functionality; Low positive correlations were found between (a) contractor's factors and performance of cost, time, safety, health and (b) functionality, equipment factors and performance of time, health & safety. In the case of Iran's building industry, financial issues of owners, government-related factors, poor planning, and schedule were found to be the root causes of delay. Apart from the government-related factors, owner & contractor-related factors contribute to the maximum delay. The availability of skilled workforce and material also contributes to the delay. Within all stakeholders, owner and owner-contributed factors play a crucial role in successful project completion. Owners impact the project significantly through changes in design, delays in approvals of design and sample materials, payments to contractors etc.[26]. Like the owner, consultants of a project too play a crucial role in causing delays in a construction project. Incomplete design and design errors lead to a change of scope during the construction and, in some cases, lead to rework, which seriously impacts the project schedule. There is a direct impact of technical accuracy in the design drawings from experienced designers and the magnitude of delay in construction projects. This can be partially mitigated by adequate supervision by the project managers resulting in a reduction in the scope of rework [14].

Most of the studies on delays in construction projects are stakeholder centric. The country's culture also plays a vital role in the project outcome measure, especially the delay [13]. The owners as stakeholders cause the maximum delay in the US, where the organisations follow clan culture. In contrast, construction companies cause the maximum delay in India, where the organisations follow the market culture. Their study establishes a close association between organisational culture and its impact on delays in construction which necessarily lead to adding the organisational culture as one element to be explored in evaluating the causes of delays. So, it can also be concluded that the owners nurture an organisation's culture and are indirectly responsible for delays attributed to the organisation's culture. In Rwanda's commercial building projects, delays are caused by factors related to contractors, equipment, environment, design, project material, relationships and owners [24].

Moving towards the cost as a critical measure of success, a study by Devi C [12]reveals that it is the most unanimously agreed issue in the performance of non-infrastructure construction projects in India, and 68% of the increased cost occurs in detailing of the design (pre-construction stage) and only about 37% occur at the execution. This clearly shows the poor quality of designs, which eventually leads to scope creep, changes in design, reworks at the site and delays in resolving design gaps. Indian developers (owners) tend to award the contract to the bidder who has quoted the lowest and thus does not necessarily lead to lower project cost but opens up many issues such as contractual claims and disputes. There is other plethora of issues, such as inadequate project management, inappropriate contracting strategy, contractual clauses, lack of coordination at sites and communication gaps, and lack of planning and

scheduling, which lead to eventually overrun in the project cost. All these bearing few, such as escalation of material prices or inflation, increase in wages etc. which are external in nature, are internal to the project stakeholders.

Many times, delays are evaluated along with cost overruns. In the study of educational building projects in Egypt [15], about forty different causes of time and cost overrun with importance to the owners, consultants and contractors were identified and categorised into seven groups. The main reasons were the instability of prices, escalation in material cost, delays in payments to contractors, and funding availability with contractors. Except for instability in prices and escalating material costs, the rest of the causes are linked to stakeholders' actions or inaction. In the case of specialised buildings such as Green Building development, other factors like technical capability, availability of contractors, availability of materials, availability of consultants, and managerial factors etc., become prominent due to the newness of the concept & construction methodology and lack of advancement of the knowledge in the respective countries [44]. The relative weightage of external factors compared to stakeholders' factors are relatively high in such specialised construction.

Assessing the risks associated with a project is a way of evaluating the critical success and failure factors. Developing countries have unique challenges in construction projects due to high-risk levels emanating from economic situations in those countries. In an analysis of risks associated with construction projects in Yemen [43], risks were categorised into internal and external. All the internal risk categories, such as owners, consultants, contractors, design, organisation and resources, were from the project's stakeholders. Only risks such as economic, environmental, political, and force majeure were external to the project. In the case of Yemen, three of the four critical risks were external by nature. This is a phenomenon associated with the economic situation of a country at the time of the study, and these factors keep changing their ranks to different economic and political conditions of the countries under study.

3.2.2 Critical Success Factors

If we focus on factors leading to project success, what we call critical success factors, one of the critical dimensions is project management. The project managers and their competence play a key role, followed by organisation competencies, structure, culture etc. Together they cannot deliver a project unless they are backed by robust processes and tools supported by technology, coordination, and communication techniques. The scope of these would vary as to each type of project, scope and complexities [4]. In the study of critical success factors by Murat Gunduz and Mohammed Almuajebh [40], a list of forty factors leading to project success in the construction industry was summarised into seven groups. Except for the factors related to the project, the rest of the six groups, viz. organisation, owner, project manager, project management, design and contractor, are stakeholders oriented. The key to project success was the significance of the availability of funding and timely payments, the bandwidth and capabilities of project managers, and the ability to get timely approvals from authorities. Project managers play a crucial role in achieving project success, and the competencies of these project managers, along with leadership skills and emotional intelligence, positively impact the project outcome and, thus, the project's success. Emotional intelligence enables the project managers to understand the stakeholders' point of view, which helps improve the trust levels between the stakeholders. It is believed that project managers, through their interpersonal skills and teamwork, can avoid delays by effectively collaborating with other stakeholders [45].

In the evaluation of critical success factors in the projects in UAE and the Middle East [46], the technical capability of the contractor, defining the scope of the project with the least scope gaps, project control systems, efficient site management, the skill set of the project managers etc. were found to have a massive bearing on the project success. The external factors, such as climate & force majeure, do not impact the success much. As said, the local geographical conditions and political & economic state of the researched countries could make these external factors essential or less important. Many of these critical success factors fall within the stakeholders' domain and are well established.

On critical success factors, especially in a developed country, the scope and intensity of the impacting factors change in order. In the case of Australia, site layout & logistics plan, project development planning, and Plant Machinery Vehicle (PMV) planning take precedence over others in determining the project outcome and are considered the best practices. In the case of developed countries, the focus has shifted from risk management to productivity enhancement. These factors are internal to the project company and influenced by the stakeholders. A positive correlation was found between the company's stature, experience, and best practices [47].

Having understood the critical success and failure factors, it is essential to know how much of these factors apply to an ITOB project in India, given that these factors vary as to each type of project and the political, economic and development state of the country being researched. This leads us to the following research question.

RQ4: What are the critical success & failure factors impacting the project outcome of an ITOB project in India? How many of these are internal and external?

RQ5: How are the stakeholders' performance impacting critical success & failure factors of ITOB projects in India?

3.3 Project Success

The third and final area of research is project success. Project success is a broad term having multiple connotations & perceptions by different stakeholders [48]. What is success for one stakeholder may not necessarily be success for another stakeholder. Further success at the entity, portfolio, and project levels differs. Success at the project level is the culmination of all efforts starting from the stakeholder's level, their action & inaction leading to performance impacting the project success and failure factors and how & how much they influence the outcome.

There is no uniformity or acceptance of how each stakeholder perceives success. The concept of success evolved over the last five decades in multiple directions. What started as a narrow definition of project implementation at the core of the project success in the 1970s has moved towards the interpretation of success by the critical stakeholder viz project execution team and the owners between 1980-2000. Multiple stakeholders and their perspectives on critical success factors got added in this period. From the generic definition of success prior to 2000, it started revolving around the stakeholders post-year 2000. Even now, the role of project managers in defining success overshadows the perception of success by others. Works of authors such as Turner and Zolin (2012) and Pinto and Slevin (1987) on success factors are still referred to as the basis of interpreting success. The Iron Triangle (Atkinson 1999) of time, schedule and quality continue to be on the top when it comes to project success in general. It was also felt

that stakeholders beyond the projects, such as the program portfolio or senior management, have never been included in the scope as they, too, get impacted by the project in some way. If the projects are conceived & invested by the owners, executed and managed by the Managers and used by the clients/users, we must assess the commonality of critical success factors and success from their point of view. Bearing few, there has yet to be an agreement on critical success factors between them [48]. All these lead to more significant ambiguity in understanding the construction project's success. The overall project success is much broader in its definition, usage, understanding and interpretation, as confirmed by (Collyer & Warren, 2009; Cooke-Davies, 2002; Jugdev & Müller, 2005; Shenhar et al., 1997; Shenhar & Dvir, 2007; Thomas et al., 2008; Turner & Zolin, 2012, [28], and much more comprehensive than the 'iron triangle' (Atkinson, 1999).

Stakeholder satisfaction is considered one of the vital parameters or measures of project success. Stakeholder satisfaction through effective stakeholder management has a very high positive impact on project success [49]. The leadership at the project level and how well the projects are integrated at various levels determine the performance in terms of overall project management. Impactful project management, in turn, determines stakeholder satisfaction [23]. Another dimension of project success is project efficiency. Per the study by Pedro Serrador [28], there is a 60% correlation between project efficiency and project success; within this, 51% represents cost and time. However, the definition of project efficiency is limited to meeting the schedule, budget & scope goals which is nothing but the Iron triangle. However, there is still a 40% gap represented by the other aspects, possibly including other stakeholders' satisfaction and external factors. Suppose project performance comprising cost, schedule, quality and stakeholder satisfaction represents the project success measure, approximately 25% of performance is impacted by the project management and organisation culture [50]. So, the remaining 75% of the project performance involving cost, time, quality and stakeholder satisfaction is impacted by other factors. As per the study by Yvette Ingabire [24]on Rwanda commercial building projects, the success of the development is indicated by the performance of cost, time, quality, client satisfaction, functionality and health and safety.

If project performance is considered a representation of project success, it is not to measure them in monetary terms every time. In their assessment of performance areas in construction projects in India, Prachi Vinod Ingle and Gangadhar Mahesh [42] have gone beyond the Iron Triangle, safety, and stakeholders' satisfaction and added five more criteria for evaluation, viz customer relation, environment, productivity, collaboration and communication. Of these, customer relations, communication and collaboration revolve around the stakeholders. The environment encompasses the techno-politico-socio-economic environment of the project, and productivity is related to time and cost. In a nutshell, almost all of the factors or measures of success revolve around the stakeholders and their performance.

Project integration directly impacts project management success, viz. timely completion, execution within the budget, achieving quality, and highest safety and satisfaction of the owners. The critical role of a project manager is binding the various aspects of a project, such as a project charter, process, knowledge, people, supplies etc., and it is known as project integration [51]. A distinction has been created here between project success and project management success. As per Ata ul Musawir et al. [6], project success is a combination of project management success (achieving project plan & triple constraints), project ownership success (realisation of business case), and project investment success (value generated by investment). The latter two are from the project funder's point of view. This is a step ahead compared to all the earlier studies, as the scope of success has gone beyond the project and

includes post-project scenarios as well. The relevance of this can be well understood in the classic case of the Sydney Opera House. Though it was not executed within the budget and timeline (which means a failure under triple constraint) has got its name in the tourist map of Australia and thus generates regular income from the flow of visitors. So, while it can be termed as a failure from the point of view of project management, it is indeed a success from an investment or ownership point of view. The above study establishes a high correlation between project governance and project success through the benefit management and that project governance is an essential guide for project management. The governance is contextual as it is based on the framework, function and processes pertaining to the project.

The underlying finding of the study by Kate Davis [41] is that there are differences in the opinion of each stakeholder in defining success, and it is the responsibility of the project managers to identify, engage and manage the expectations of each stakeholder. In a structured literature review by Matthias Albert et al. [52], the author, in line with the findings of Davis (2014) [48], concludes that there is no commonality in the definition of project success. Iron Triangle (Atkinson 2019) remains a prominent interpretation, but there are other criteria, and many project-specific criteria get added. The definitions of success within and between applications vary and are inconsistent. The author believes the possibility of assessing the success of a project using different measures and the outcome could be very different, which makes the whole exercise a subjective one. Creating a generic model for assessing project success is the need of the hour. The determining factors are the field of application, stage of development and the critical success factors used. Another aspect to be checked is whether the stakeholders change the criteria during the course of the project. All these make the project manager's job to precisely decide the success measure of each of the projects in the above context.

So, in line with the findings of Matthias Albert et al. [52], it can be concluded that the definitions of success within and between the field of applications vary and are not consistent. The field of application, stage of development and critical success factors have a bearing in defining the project's success. The projects are part of programs, programs are part of portfolios, and portfolios are part of the organisation. The ‘triple-test performance framework’ suggested by Zwikael and Smyrk 2012, evaluating the project success at management, ownership and investment levels has huge relevance to our approach to defining success. This leaves us with the next set of research questions.

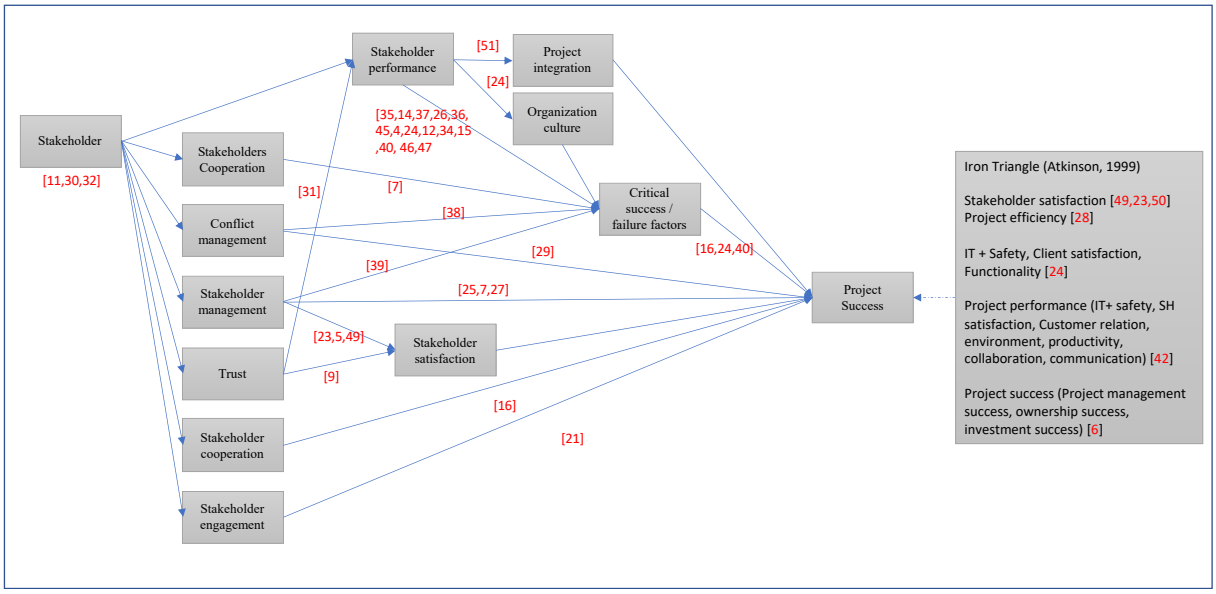
RQ6: What are the success measures of an ITOB project in the Indian context and stakeholders’ point of view?

RQ7: What strategies can be developed to influence the stakeholder’s performance such that project success can be largely assured?

3.4 Mapping the literature review

As given below, an attempt is made to map the above findings from the literature review in terms of a framework.

Literature review – Resultant framework



3.5 Research gaps

The notable gaps in the research are:

1. There are no studies on the development challenges or success of ITOB projects in India
2. The current studies do not differentiate the ITOB from other construction projects or building projects
3. The present studies on project stakeholders, stakeholders' performance, success factors, and project success are isolated research on specific relationships between certain variables
4. There is no comprehensive framework that captures all the critical variables and establishes the relationship between them
5. There is no agreement on what constitutes success in the development of an ITOB project from the stakeholders' perspective and what factors lead to this success

4. Use of existing Theories

The following theories are planned to be adopted in the proposed research work.

4.1 Stakeholders Theory

R. Edward Freeman formulated the Stakeholder Theory in 1984, and as per the theory, value creation should be for all stakeholders and not limited to shareholders alone. As per Freeman, "the Stakeholder is any group or individual that can affect or be affected by the realization of an organization purpose"[21].

This theory is very relevant to the proposed research as it intends to examine the influence of stakeholders on the success of ITOB projects in India. The stakeholders influence the project outcome, and their expectations and needs must be considered in devising project development strategies. For the project to be successful, all the stakeholders need to be satisfied and successful in their own way. While many newer concepts have been proposed/added over the period, the foundation remains the theory as proposed by Freemen in 1984.

4.2 Complexity Theory

Baccarini proposed Complexity Theory in 1996, and as per him, Complexity is "consisting of many varied interrelated parts and can be operationalised in terms of differentiation and interdependency.". The interaction between various components of the larger system and the resultant feedback, keeps the system changing constantly.

Modern building construction involves multiple stakeholders. Each stakeholder views the project execution complexity from their point of view and formulates their strategies accordingly, resulting in further complexity. A typical ITOB project involves multiple packages implemented by a specialized contractor. Apart from this, we have numerous consultants giving design inputs for the project. The level of complexity increases when all these stakeholders come together to deliver the project where time, cost and quality are the driving force. From the project management perspective, the complexity theory will help evaluate the complexity more objectively and help implement the project successfully. For this research, it would be imperative to understand the perspective of complexity from each stakeholder's point of view, as these perspectives will determine the stakeholders' behaviour and performance[53].

5. Significance and rationale of the research

ITOB, the subject matter of this research, are complex building project. They are equivalent to a modern factory in an intelligent and sophisticated building, working 24 by 7 with high occupancy of software and data engineers serving customers across the globe. As people working in office buildings spend most of their day and, in many cases, even the nights, these offices' ecosystem should be so robust that it enables to bring the best in the people in terms of productivity [26]. So, these buildings' scope of development and design always takes centre stage.

The complexity of an ITOB arises in all stages of its development viz identification of location, design, pre-contract, execution, finishing, onboarding clients and operations. Pre-construction stage involves multiple complex activities such as feasibility and reconnaissance studies, title clearance of the land, preparation of development options, studying the market and market requirements, preparing initial project estimates, sourcing initial capital and funding by establishing the viability, understanding the development control regulations of the location of development etc. [51].

Modern office buildings prefer infill locations closer to public transport stations. Commuting to work is a crucial consideration for the employees, so the blend of living in residential localities and not having to travel much to work compels the developer to choose locations that achieve the balance between the two. By government norms and due to high-density occupation, most of these buildings utilise nearly 40-60% of constructed space for parking. In a typical ITOB, the ratio of office space to car parking ranges between 750 SFT:1 car park to 900 SFT:1 car park. As per the handbook of planning of office buildings by the Central Public Works Department, India (CPWD), the ratio prescribed for Government is 1.8 equivalent car park for every 100 SQM.

Over time, the complexity of the design of these buildings has increased multifold. These spaces are no longer looked at as brick and mortar but as spaces of experience. Per CPWD, health, comfort, and employee satisfaction are paramount in high-performance buildings such as ITOB. The occupiers of these spaces place their employees at the centre and design the offices around their well-being and health. One of the complexities in designing commercial office space is the approach towards the functionality of the building, which has a significant bearing on the design. The owners come in first to the design exercise, and the tenants or clients arrive much later.

Given that each has their own approach and vision for space utilisation, both goals still need to be fully met [24]. The complexity increases when the space is created as "built to suit" a client. The client's intervention becomes more, which calls for experts within the system to advise the developers/ owners [24]. Requirement of fresh air ventilation, good air quality within the office (use of non-toxic materials), personalised climate control systems, external views, ventilation, noise control acoustics, LEED certification, energy-efficient design with more daylight, position around sun shadow path to avoid heat inside the office and the consequent impact on the air-cool system, advanced access control system, robust façade system, intelligent and "Smart Building" able to adjust the building lighting and aircon system based on the external environment, the highest level of security and the Smart Building management systems (BMS) etc. making them highly complicated as all of these increase the level of coordination between multiple specialist consultants and vendors during design and execution respectively. Another critical dimension is fire safety and evacuation measures required in emergencies, as the

occupancy of these buildings is very high. All of this need to meet international norms as the users are international clients or serving international clients. Usually, these requirements and compliances come as a short-listing / selection condition.

A typical user of ITOB or tenant acquires the space based on their business plan, and they prefer a building close to completion so that they do not have to wait too long to occupy or acquire the space and not wait for their business to grow. As a developer, they cannot develop the building without having a client at least prior to completion, without which the carrying cost of constructed yet unoccupied building would erode the venture's profitability. So, the window available for an ITOB developer is very narrow and in that he must source a tenant who might have unique requirements that need to be catered into the design & development. This creates two conflicting possibilities for the developers of ITOB. How much to delay the start to align with leasing prospects and ability to deliver the building in the quickest possible time from the execution of expression of interest by a potential tenant, as the time to occupy is always lesser than time to completion in most of the situations. This brings enormous pressure on the schedule, and the lease agreement has huge penalty clauses for the delay in handing over space by the developers of ITOB to the tenants. The other challenge is that whenever a client is onboarded (especially anchor clients), they usually prefer to give their inputs right from the look and feel of the spaces to the requirement of special infrastructure. The development might be halfway through, resulting in changes in design and alteration midway. This results in a considerable delay in completion. Changes during construction have always been a critical delay factor [14].

ITOB development works can be classified into nearly 25 trades of different types, each requiring specialised contractors. Mechanical Electrical and Plumbing works (MEP) and interior finishing works are of high-risk category as they contribute to the maximum project cost and schedule of a building project. They depend heavily on multiple suppliers and subcontractors to complete these works, and the work happens across floors. There is a high dependency on one vendor's performance on the subsequent vendor based on quality of work, incorrect work, and delays. The complexity further augments when the owners make changes, and there are supply chain disruptions [16]. There is constant pull and push between the main contractors, nominated sub-contractors, and suppliers of different trades such as MEP, structure and finishing contractors [16]. The complexity of finishing works is like the climax of a movie wherein multiple stakeholders are involved, and the number of contractors and their coordination is intense [16]. The Covid and geopolitical situations have disrupted the global supply chain systems augmenting the risks associated with timely completion. In these stressful times of global warming, international users/clients closely scrutinise commercial office buildings as these buildings contribute nearly 40% of "Greenhouse emissions" as per Architecture 2030[g]. The above number increases when the associated activities, such as the impact on transportation etc., get added.

The development of ITOB involves multiple stakeholders. To start with, the developer or owner assumes the maximum risk in the development and is also the key driver of various decisions from design, the appointment of contractors, payments etc. The designer of the building (consultants) is the next most important stakeholder. In a typical ITOB building, there are more than ten consultants, such as architects, structural consultants, and consultants for almost all critical trades such as façade, traffic and vertical transportation, lighting, HVAC, finishing, amenities, landscape etc. Each of them is a specialist in their trade, and it is a herculean task to bring them all on board and align them to work together. Each time a building is designed, they all need to be appointed, and it takes a lot to get them aligned before any meaningful,

coordinated drawings can be produced. As said, given multiple trades and their specialisation, the number of contractors, subcontractors, and suppliers to be appointed is again enormous. They need to work as a cohesive unit to ensure interdependencies between trades do not impact the project schedule. This has been one of the primary sources of delay[16]. Apart from owners, consultants and contractors, we have clients (end users), lenders, government agencies and finally, project managers who contribute in multiple ways to critical success & failure factors of the ITOB.

Even though commercial buildings are high revenue generating activities (subject to demand-supply economic scenario and location), they are saddled with poor productivity and a high probability of breaching the time and cost budgets by 20-100% [26]. Inappropriate design, not being contemporary, poor land title etc. too, can cause havoc in the owner's ability to lease or trade the building after development [26].

Time commitment under the leasing agreements, competition amongst the developers to acquire the maximum share of pent-up demand for leasing of space, high cost of borrowings, fluctuating prices of construction materials etc., push the developer to tradeoff between quality, cost and time, as noted in the book titled "The commercial real estate revolution" by Rex Miller et al. 2009. According to them[h], 50% of the construction cost in the USA is wasteful in nature, and this is due to issues like paucity of time, lack of coordination between departments, lack of innovation in planning, lack of coordination between trades, lack of knowledge transfer between vendors and developers, capacities & newness of execution teams etc. Regarding the Indian context, there are not many studies, especially on the development aspects of commercial office buildings [26]. As stated above, the development of ITOB generally has multiple stakeholders and many variables. Many factors driving this complexity are interlinked at certain levels and have cause-and-effect relationships. There are no specific studies to evaluate the above and suggest strategies to mitigate them [26].

This research aims to fill in the above gaps by differentiating the ITOB from other construction projects in the Indian context, identifying unique challenges they embark upon in the development, identifying the stakeholders, and understanding their relationships and scope of influence on other stakeholders which eventually lead to critical success and failure factors and thus the success of the development. This will help to formulate appropriate strategies and interventions in the stakeholder's relationship management such that the impact of their performance can boost the success of the ITOB projects.

As per JLL research, an estimated 450 Mn SFT of Grade A offices will likely be added to the existing stock by 2030. Even if we have to take the last one-year data for the composition of ITOB within Grade A office stock (approximately 30%), the estimated quantum of addition in ITOB until 2030 can be conservatively estimated at 135 Mn SFT.

Delay is one of the CSFFs, and an illustration is presented here to explain the financial impact of delay in a typical ITOB project. Avoidance of potential delay and consequent avoidance of financial loss is one of the many possible benefits of this research.

Illustration:

	Building size (Leasable area)	1 Mn SFT
	Development cost (based on leasable area)	3500 P/SFT
	Total development cost	Rs. 350 cr.
	Potential rent	Rs.50 per SFT per Month
	Debt equity ratio	3:1
	Interest rate on project finance	14%
	Cost of Equity	18%
	Weighted average cost of capital	15%
Scenario 1: Project completion stage @ 50% by value		
	Amount invested	Rs.175 cr.
	Notional interest on investment per month	2.18 cr
Scenario 1: Project completion stage @ 90% by value		
	Amount invested	Rs.315 cr.
	Notional interest on investment per month	3.93 cr
	Notional loss of rental income per month	5.00 cr

Per the Ministry of Statistics and Programme Implementation Annual report of 2016, delay in construction projects in India is anywhere between 1 to 261 months [13]. Though this may not be strictly applicable for ITOB projects in the similar intensity, the delay has been one of the main concerns for developers of ITOB projects in India.

Avoidance of 3 months of delay in developing 100 Mn SFT could lead to saving in interest cost of about Rs.1200 cr. and opportunity gain of about Rs.1500 cr.

Timely completion of the project is one of the success measures, and this research shall focus on multiple stakeholders' factors influencing the project's success. Hence the benefit of this research to the ITOB development industry is expected to be substantial.

6. Research model & formulation of Hypothesis

6.1 Objectives of the proposed research

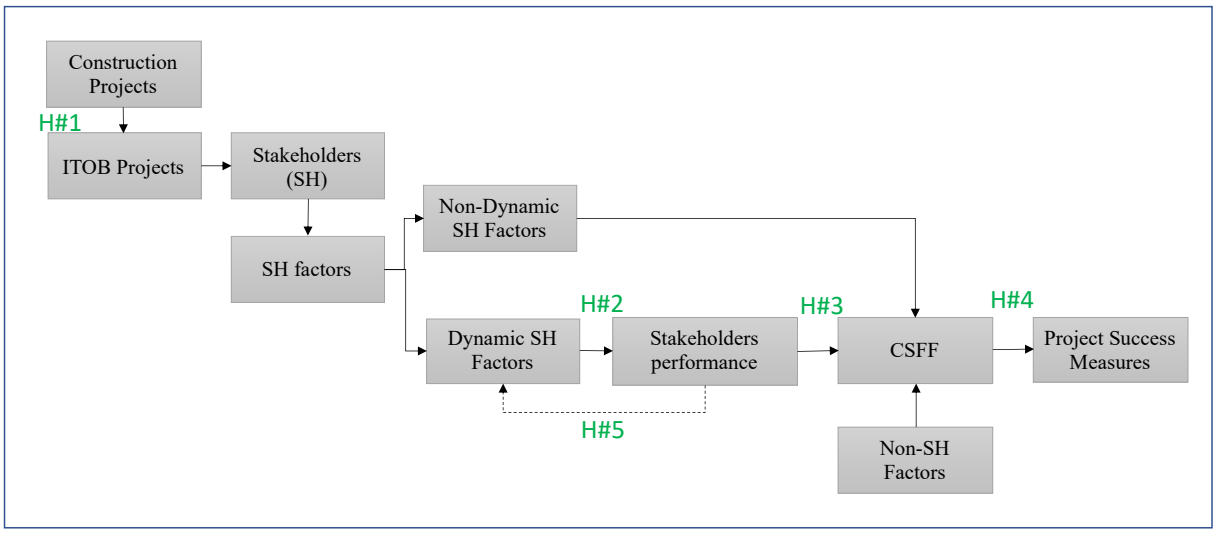
Based on the literature review and the research gaps, the objectives of the proposed research are framed as under;

1. Understand the ITOB projects of India from the context of development, their stakeholders and the stakeholders' factors
2. Evaluate how the stakeholders' factors influence critical success & failure factors through their performance
3. Understand the critical success and failure factors of ITOB projects in India and their relationship with project success
4. Understand what success means in the development of ITOB in India and formulate stakeholder-based strategies to influence the outcome of the project

6.2 Proposed Research Framework

The research on the topic done to date has been conceptualised into an integrated framework as given in section 3.4. The association between stakeholders factors, CSFF and PSM, are diverse. Each of the authors has focussed on one or more aspects of stakeholder factors and how they directly or indirectly impact PSM. There is no integrated study combining all the stakeholders' factors, assessing the mediating and moderating variables leading to PSM of a construction project and, more specifically, the building projects or ITOB. This forms the basis for the proposed research framework. The following research framework has been developed based on (a) the Literature review, (b) the research gaps, (c) Objectives and (d) understanding of the ITOB development challenges.

Authors visualization of proposed research framework



The logic of the proposed research framework starts with categorising the construction projects into various sub-groups, as explained in Table 2 of this report. This is considered essential as the challenges in the development and outcome of ITOB projects are perceived to be different from the other construction projects. There is greater risk in assuming that what applies to a

construction project would be similar to ITOB projects, given the differences in complexity, planning, stakeholders, development scope, budget, schedule and project success. Additionally, this helps to narrow down the evaluation of variables to ITOB projects such that the research outcome can be more realistic and not generalised for any construction projects, as evidenced in the Literature review. This leads us to the following Hypothesis.

Hypothesis #1

H_1: *From the developmental challenges & success perspective, the ITOB projects are different from the other types of construction projects*

H_0: *From the developmental challenges & success perspective, there is no difference between the ITOB and other types of construction projects*

Using the Stakeholders Theory (Freeman, 1988) and research done by other authors [21], an initial set of stakeholders shall be formed, which shall be validated during the course of the research. The empirical studies on stakeholders [11][30][32] highlight various stakeholder factors but do not differentiate them into those which can be influenced and those that cannot be influenced. Stakeholder factors are assumed to be the factors under the influence of each stakeholder and have a direct and indirect impact on the project outcome. They have been christened here as Dynamic and Non-Dynamic factors from the point of view of their ability to influence stakeholder performance. For example, the experience of a contractor cannot be changed during the course of the project execution. Hence, it would be considered as a Non-Dynamic stakeholder factor (NDSF). However, factors such as change of design by the owners are the result of the action & inaction of the stakeholders and can be influenced through strategic intervention. Hence these would be grouped as Dynamic stakeholders factors (DSF).

Stakeholder performance is the act of discharging the responsibilities by each stakeholder in the project delivery in the most efficient and successful manner, including their action/inaction towards the dynamic stakeholders' factors attributed to them, which are at times impacted by other stakeholders' performance. NDSF also impact the stakeholder performance in a way. However, the same is not considered for evaluation here as they are non-dynamic and not resulting in the action & inaction of stakeholders. They are known from the initial stage of the project execution, and these NDSFs should have been considered as the project's risk factors or deemed to be part of an informed decision. In this research, the focus on stakeholders' performance is limited to those emanating from the action & inaction of the stakeholders, which are dynamic. This leads us to the following Hypothesis;

Hypothesis #2

H_1: *There is relationship between dynamic stakeholders' factors and stakeholders' performance of ITOB Projects in India*

H_0: *There is no relationship between dynamic stakeholders' factors and stakeholders' performance of ITOB Projects in India*

The next step would be to draw the Critical success & failure factors (CSFF) from the earlier research work and narrow them down to ITOB projects in India. Empirical studies would be used to assimilate these factors and would be validated through the research work. A similar approach would be adopted for the Project Success Measures (PSM) for ITOB Projects. Apart from stakeholder factors, other factors, such as climate, force majeure etc., can impact the CSFF. This helps us formulate the next set of hypotheses.

Hypothesis #3

H_1: There is relationship between stakeholders' performance and Critical Success and Failure Factors (CSFF) of ITOB Projects in India
H_0: There is no relationship between stakeholders' performance and Critical Success and Failure Factors (CSFF) of ITOB Projects in India

Hypothesis #4

H1: There is relationship between critical success & failure factors and the success of ITOB Projects in India
H0: There is no relationship between critical success & failure factors and the success of ITOB Projects in India

The new dimension and focus of this research hinges on the following critical assumptions;

- Most of the factors affecting PSM emanate from stakeholders' performance
- The action & inaction of one stakeholder (Dynamic SH factors) affect the performance of the other stakeholders, and they are internal
- What is internal can be managed successfully by adopting suitable strategies

The question is at which stage of this framework the interventions need to be introduced. The suspected association is a series of interlinkages, viz. one DSF impacting another stakeholder's performance which in turn results in his action or inaction (DSF), further resulting in the performance of yet another stakeholder etc., making it a chain effect or interwoven DSF and SH performance. For example, the owner, in the endeavour to reduce the project cost appoints a less qualified consultant (DSF), resulting in poor quality of design (SH Performance). This prevents the contractor from accelerating the work (DSF), resulting in an extended timeline for project activities (SH Performance). This goes on until no further stakeholders get impacted, and it becomes a CSFF. So, there is a suspected internal loop between the DSF and SH performance; this is the precise location that needs to be altered with strategy. To establish this, we need to test the following Hypothesis.

Hypothesis #5

H1: The performance of certain stakeholders can impact other stakeholders' Dynamic SH factors
H0: There is no impact by the performance of certain stakeholders on other stakeholders Dynamic SH factors

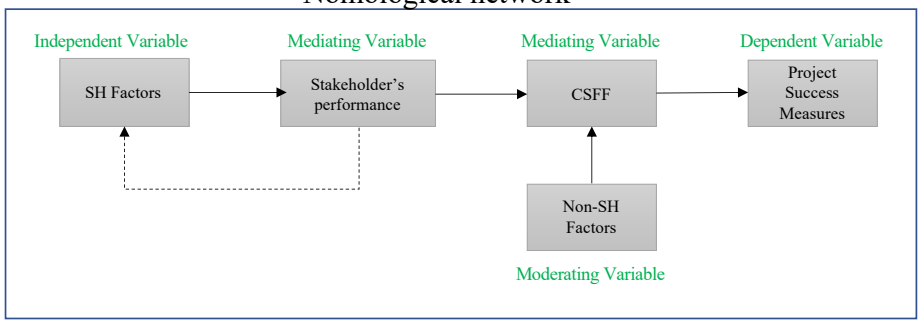
6.3 Defining the Variables

In the above research framework and Hypothesis, the following variables will be evaluated, and the resultant nomological network is as under;

Independent Variable	Stakeholder Factors
Dependent Variable	Project Success Measures

Mediating Variables	i. Stakeholders performance ii. Critical Success & Failure Factors
Moderating Variable	Non-Stakeholder Factors impacting CSFF

Nomological network



The following table summarises some of the examples under each of the variables as evidenced in the Literature review;

Stakeholders Factors	Stakeholders performance	CSFF	Non-SH Factors	Project Success Measure
Independent Variable	Mediating Variable	Mediating variable	Moderating Variable	Dependant variable
• Design process • Financing arrangement • Planning abilities • Robust processes	• Good Quality design • Timely payment • SH coordination • Responsiveness of PMs	• In time completion • Quality • Leadership • SH cooperation • In budget	• Inflation • Weather condition • Force Majeure	• Client satisfaction • Profitable contract • Brand appreciation • Investment returns

7. Research Methodology

7.1 Research Design

7.1.1 Research Philosophy

Research philosophies guide the research processes and must be considered as part of the assumptions in developing the research design. Since the research is based on the opinions, experiences and perceptions of the people, which are subjective (Phenomenology), and measures the relationship in an objective way (Positivism), this research falls in between and hence **post-positivism** in its approach [28]. It has a multiplist view involving qualitative and quantitative evaluation in achieving objectivity, enabling scrutiny of what otherwise is subjective due to its social in nature [41].

7.1.2 Type of research

From an "Application" point of view, the proposed research shall be Applied Research.

From the "Objective" point of view, since the research shall focus on discovering ideas and insights from the people who have had experience with the problem & phenomenon and detailing the phenomenon in the subsequent steps, it shall be a combination of Exploratory Research and Descriptive Research. To achieve the research objectives, it is essential to understand the stakeholders for ITOB, the stakeholders' factors, and how they can be further segmented into dynamic and non-dynamic factors. Understanding the CSFF Factors and what constitutes project success measures is equally necessary. Not much empirical data regarding ITOB projects is available in the public domain. All these fall into an exploratory type of research. Post-factorisation of this information, sample data will be collected to describe the relationship between them and the association of Independent Variables with the Dependent Variables. This segment of research falls into the descriptive research method.

In the book titled "Multivariate Data Analysis" 8th Edition by Hair et al., they have summed up the situation warranting exploratory and descriptive research under three situations.

1. When the research problem is not defined clearly, and enough information is not available to explain the relationship clearly.
2. When hypotheses are generated using qualitative research and tested using quantitative research, especially where the hypotheses are drawn from past research in one region or country and tested for application in the context of another region or country.
3. Exploratory research helps answer what, when, why and how, which is not the case in confirmatory research, where the Hypothesis is drawn from previously established theories in similar contexts.

The above observations fit the proposed research work and confirm the type of research from the Objective point of view.

From the "Enquiry mode" point of view, this shall fall into a combination of Qualitative Research and Quantitative Research, as Exploratory research are qualitative by nature, and Descriptive research is quantitative by nature.

7.2 Research questionnaire and Sampling

Based on empirical evidence, the stakeholder group for this research can be concluded as consisting of owners, consultants, contractors, project management professionals, lenders & investors, end users, the government etc. Based on the research hypothesis, the research needs to be done in two stages.

In Stage 1, viz., the pilot study stage, two expert panels would be formed. Group 1 would represent two experts from the fields of building architecture, design, execution, management of projects, marketing, lending, developer and liaisoning, etc., with a minimum experience of 20 years in ITOB projects and the field of construction. As step 1, key differences between the construction project and ITOB from the developmental challenges & success perspective needs to be evaluated. Since there is no adequate research work in this area, a pilot study would be conducted using the experts from Group 1 to help create the list of factors differentiating ITOB from construction projects. An initial list of factors would be created based on available information. The experts would be encouraged to add/delete if they find any factors appropriate or inappropriate for the research question under review [16]. Establishing the face validity that the factors listed truly represent the construct under evaluation is a critical step in formulating the research questionnaire and further investigation. The expert panel so formed (Group 1 experts), as they also represent the stakeholders' group, would be used to establish the initial face validity of Project Success Measures (PSM) collated from the empirical evidence and research in the area.

The second group of experts would consist of project management professionals, engineers and construction managers having a minimum of 20 years of experience in one or more ITPB projects in India. They will be requested to do the face validity of (a) Stakeholder factors, (b) Critical success failure factors (CSFF) and (c) Non-SH Factors extracted from the Literature review.

In stage 2, a detailed questionnaire shall be developed. The Questionnaire shall have three parts. The first part would consist of the information and purpose of the survey. The second part would consist of the respondent's personal information to validate that the criteria set for their being eligible to participate in the survey are met. The third part of the Questionnaire would be asked to

(a) Rate the degree of influence of the Dynamic SH factors of each stakeholder on other Stakeholder performance
(b) Rate the degree of influence of the Non-Dynamic SH factors of each stakeholder on other Stakeholder performance
(c) Rate the degree of influence of each SH Performance on each of the CSFF
(d) Rate the degree of influence of each of the Non-SH Factors on CSFF
(e) Rate the degree of influence of each of the CSFFs on PSM

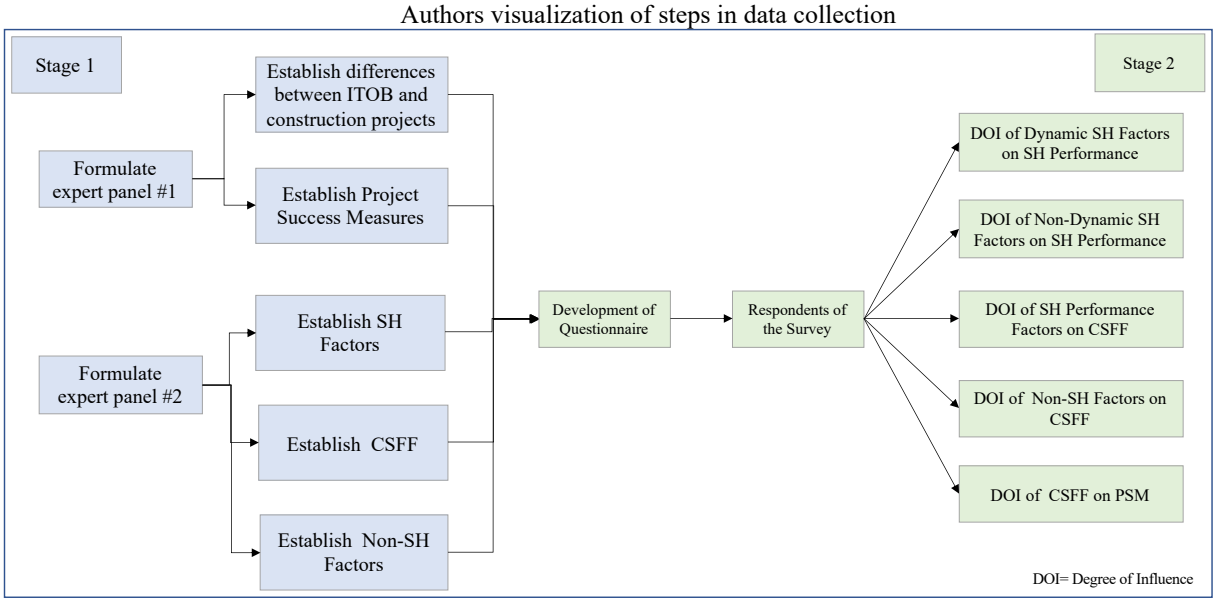
To establish the degree of influence, the "Five-point Likert scale", with a range of 1-5, 1 being not significant to 5 being extremely significant, shall be used.

The respondents for this research (stage 2) shall be (a) project management professionals or PMP-certified professionals or engineers or construction managers with post-graduation degrees, (b) having a minimum of 10 years of experience in the development of one or more

ITOB projects in India and (c) having been involved in the ITOB project in the execution management at a senior position.

Pictorial visualisation of the above steps in data collection is given hereunder;

Authors visualization of steps in data collection


Stage 1
Establish differences between ITOB and construction projects
Formulate expert panel #1
Establish Project Success Measures
Establish SH Factors
Formulate expert panel #2
Establish CSFF
Establish Non-SH Factors
Development of Questionnaire
Respondents of the Survey
Stage 2
DOI of Dynamic SH Factors on SH Performance
DOI of Non-Dynamic SH Factors on SH Performance
DOI of SH Performance Factors on CSFF
DOI of Non-SH Factors on CSFF
DOI of CSFF on PSM
DOI= Degree of Influence

7.3 Sample size & sourcing

Any project management person who has been part of the execution of ITOB buildings in India is technically eligible to provide his/her input on the degree of influence of various factors under study. However, to ensure the respondents have enough experience to give their input, minimum of 10 years of experience has been prescribed. This becomes the population for this research. There is no sampling frame or established source to get the list of people associated with ITOB.

The selection of samples shall be based on ***non-probability judgement sampling***, given that there is no formal & reliable sampling frame. If required, the snowball sampling technique will be adopted to reach the desired quantum of samples. Many organisations, such as Turner International, Jones Lang Lasalle, CBRE Richard Ellis, Cushman Wakefield, etc., are into construction project management in India. Due to the author's association with the industry and their constituents, each of these organisations' employees meeting the selection norm shall be tapped for the required samples.

With regard to the estimation of sampling size, the Cochran (1977) formula was used based on the book Multivariate Data Analysis by Hair et.al. As per Cochran's formula, two key factors must be decided: the margin of error and the alpha level. As per the study, an Alpha level of 0.05 is used in most of the research unless the research is meant to establish a marginal relationship, and a small variation in error could cause substantial implications on the outcome. The second aspect is the margin of error which is the risk assumed or acceptable to the researcher, and for categorical data, 5% of the margin of error is generally accepted. However, it is the choice of the researcher to increase this level, as per Bartlett et al. 2001. Relying on similar research by Ingle et al. [42], a margin of error of 8% has been considered. So using, Cochran’s formula,

$N = Z^2 * (p * q) / e^2$

Where z = 1.96 at the level of significance of 5%, "p" being the estimated maximum possible proportion of attributes in the population, q being 1-p (together the estimate of variance), and the acceptable margin of error is 8% for this study [42].

The resultant sample size based on the above is 150.06 or 151. As per Hair (2010), for Structural Equation Modelling(SEM), the minimum sample size would be 150 with models of 7 or fewer constructs[54]. As per Bentler and Chou (1987), 5-10 participants are required as samples per estimated parameter [54]. Based on the above, a sample size of 150 is planned for the proposed research. However, given the possibility of declining to participate (non-response), another 30% shall be added to ensure the desired number of responses is obtained[i], making the total target respondents about 190-200.

Further, PLS-SEM provides a highly reliable outcome compared to Covariance-based SEM. When multiple constructs exist and a large quantum of items, PLS-SEZ provides the solution with even smaller sample sizes (Fornell & Bookstein, 1982; Hair et al., 2017; Hair et al., 2019) [23].

7.4 Measurement

Since the study is qualitative in nature and does not produce quantitative information directly to measure the variables, they need to be converted into ordinal data by deploying a "Five-point Likert scale of importance" with a range of 1-5, which can be further evaluated using descriptive statistics tools.

1 = Not Significant/Important
2 = Slightly Significant/Important
3 = Moderately Significant/Important
4 = Very Significant/Important
5 = Extremely Significant/Important

7.5 Data collection & ethical considerations

The data to be used for this study shall be primary in nature except for the inputs from the Systematic Literature Survey, which shall be used as the basis for further evaluation. Specific statistical data about the industry shall be collated from the websites of Government organisations or published works of reputed research houses. A suitable citation shall be included where secondary data have been used. There are no case studies or meta-analyses planned for this study.

With regard to the formation of expert panels, the reference sampling method shall be employed to identify the experts from the respective fields. They shall be contacted individually, preferably in person and in the first meeting, the purpose and objectives of the survey shall be explained. They shall be made aware of the criticality of the role they shall be playing and the approximate time they need to commit to participate in this exercise. Once they provide their consent and such consent are obtained from each of the desired numbers of participants, the final list of participants in each of the expert panel shall be shared with other members in those panel. Data collection from each member shall be done individually by meeting them in person

on securing an appointment with each of them. Once the data from all the respondents are collected, the final summary shall be shared with all the participants individually.

With regard to respondents for the Questionnaire, as stated earlier, they shall be sourced from organisations, such as Turner International, Jones Lang Lasalle, CBRE Richard Ellis, Cushman Wakefield etc., who are into construction project management in India. Each of these organisations' senior management would be contacted and explained the purpose of the survey. A request shall be made to nominate employees meeting the selection criteria for the survey. Once the list is received and validated, each respondent shall be contacted in person or telephonically and explained the survey's background and consent to participate shall be obtained. Those who consent to participate in the survey shall be shared with the Questionnaire, and the background of the questions, constructs etc., shall be explained. A gap of one week shall be provided for the respondents to go through the Questionnaire and get familiarised with the content of the Questionnaire. An appointment shall be made with each of them to meet in person or through a video call to collect the responses. At the designated time, the respondents shall be contacted, and responses for each question shall be documented in hard copy. Once the survey process with the respondent is completed, the respondent shall be shared with the summary of their response and asked to confirm that the interviewer has noted the details accurately. Any errors notified by the respondent shall be duly corrected. The respondent shall be thanked for their time, and the interview shall be concluded.

The collected data shall be stored in a secured place with a lock to protect data confidentiality. As the next step, the collected data shall be tabulated, coded and summarised for further evaluation.

No force or coercion shall be applied should any potential respondent refuse to participate in this exercise in the beginning and even during the mid-course of the exercise. Should any respondent express their desire to discontinue, they shall be thanked for the time, and the discussion shall be concluded respectfully. An incomplete Questionnaire shall not be considered as a valid response for evaluation.

8. Data Analysis

The proposed research intends to list and establish the relationship between a specific set of factors or variables, and there are multiple methods to evaluate these relationships. The notable ways are Factor Analysis, Multiple Regression, Path Analysis and Structural Equation Modelling [42]. Apart from these, we have Relative Importance Index (RII) and Principal Component Analysis (PCA). Each of them has been evaluated for its usage in the proposed research.

- RII is widely used to establish the significance of a variable in an order relative to other variables. However, this only establishes the importance or rating of the variables from a group or list.
- PCA is a popular data reduction method that preserves the data's originality. This is merely a dimension reduction technique such that a smaller group of data, still representing the originality of its values, can be used for statistical operations.
- Factor Analysis is an excellent tool to establish construct validity [42]. Exploratory Factors Analysis (EFA) is a statistical technique in which the interrelated variables are identified and grouped to make them Factors so that their interpretation and structure can be studied easily. Sampling adequacy (Kaiser-Meyer-Olkin test) and Multivariate normality (Bartlett's test of Sphericity) must be checked and confirmed prior to Factor extraction. PCA is used for extraction in EFA, followed by Promax rotation (Varimax in case of no correlation between factors) and Kaiser normalisation. However, Factor Analysis cannot provide information on the relationship between the Latent variable [42].
- Creating a Path model and its analysis is called Confirmatory Factor Analysis [49]. Confirmatory Factor Analysis (CFA), popular in social research, is used to test measures consistent with the construct's nature apart from testing discriminant and convergent validities of the constructs in the model [6]. While EFA extracts the factor from the data, CFA test whether it fits the data and is used to test the Hypothesis.
- Multiple Regression Analysis (MRA) establishes the relationship between single dependent variables and multiple independent variables without testing the validation and reliability [42]. Path Analysis and Multiple Regression Analysis assume a normal distribution of the data and focus on observed variables only [42].

Whereas Structural Equation Modelling (SEM) helps understand the relationship between the Independent Variables and Dependent Variables. The most significant advantage of SEM is that it not only examines the relationship between the IV and DV but also provides reliability and validity of Latent variables in the model, a combination of empirical and theoretical approaches [42]. While SEM is primarily meant for testing theories and concepts, PLS-SEM tests the theories and explains the composite relationship between the variables [42]. The CFA and PA can be done in an SEM model simultaneously [38]. It measures the constructs and explains the relationship between latent variables [51]. This makes the Path Least Square-Structural Equation Modelling (PLS-SEM) a forecasting tool to check the fitness of the model [23]. It is used to examine the path coefficients along with the structural model [42]. Another advantage of PLS-SEM is that it is possible to compute measurements and relationships separately rather than doing them simultaneously [23]. PLS-SEM can also perform CFA to examine the construct validity and reliability [38]. PLS-SEM not only offers merits in terms of reliability, validity and resolving complex models but evaluates multiple variables at the construct level by taking into account measurement error of the variables [51]. Thus it is

preferred when the relationships are complex and simultaneous evaluation of varied Hypotheses [51].

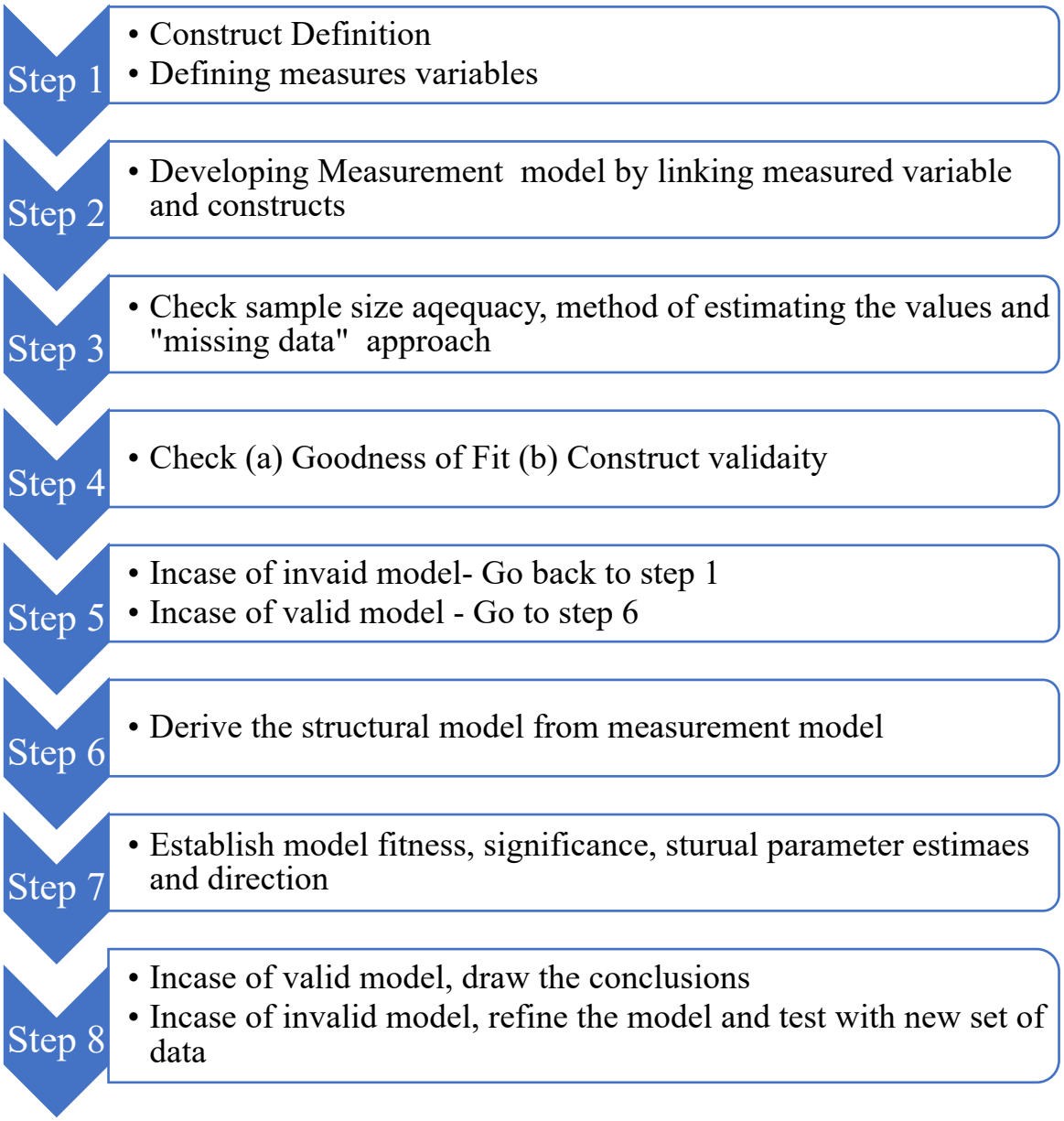
Compared to MCA requiring homoscedasticity and linear relationship, SEM can be applied where these conditions cannot be met [6]. Within the types of SEM, Co-variance based SEM is not a preferred option as it has limitations concerning the sample size, distribution within the data and complexity of the models [38]. Despite the controversy around its reliability, as per Ringle and Sarstedt (2016), PLS-SEM is scientifically reliable [23]. PLS-SEM is also widely used in construction and management-related research and strategic management [42][6].

Cronbach's alpha is a coefficient of reliability or internal consistency. This test will help establish the validity and reliability of the Questionnaire. However, PLS composite reliability test is more suitable for checking internal consistency [42]. The Chi-Square test checks the goodness of Fit test in SEM.

Based on the Literature review, it can be seen that various authors have tried to explain the relationship between certain constructs to project success. As noted in the conceptual framework, it is challenging to establish a cohesive approach to define the relationship between the constructs. Given this, it is relevant to extract all the variables under each construct within the proposed framework as step 1. The derived data shall be used under PLS-SEM, where Confirmatory Factor Analysis shall be conducted to validate the model's fitness, construct validity and reliability before approaching Structural Equation Modelling.

As explained by Hair et al. in their book titled "Multivariate Data Analysis" 8th Edition, PLS-SEM is a combination of two models viz. "measurement model", which establishes how the construct is explained through measured variables (or Outer Model) and "structural model" which shows how is the association between the constructs (or Inner Model). The Path model is a prerequisite for PLS-SEM as it captures the theory visually for easy evaluation. Between Covariance Based SEM (CB-SEM) and Partial Least Square SEM (PLS-SEM), CB-SEM is meant for Theory confirmation by estimating the covariance matrix with new data to validate the established one. In comparison, PLS-SEM help predicts the variance in dependent variables. So CB-SEM is not advisable for Exploratory & Descriptive modelling. PLS-SEM permits the use of non-metric data (ordinal and nominal) in addition to metric data making it very flexible, especially for social research.

Following are the steps proposed for SEM by Hair et al. in their book titled "Multivariate Data Analysis" 8th Edition.


Step 1
• Construct Definition
• Defining measures variables
Step 2
• Developing Measurement model by linking measured variable and constructs
Step 3
• Check sample size aqequacy, method of estimating the values and "missing data" approach
Step 4
• Check (a) Goodness of Fit (b) Construct validaity
Step 5
• Incase of invaid model- Go back to step 1
• Incase of valid model - Go to step 6
Step 6
• Derive the structural model from measurement model
Step 7
• Establish model fitness, significance, sturual parameter estimaes and direction
Step 8
• Incase of valid model, draw the conclusions
• Incase of invalid model, refine the model and test with new set of data

9. Limitations and Delimitations

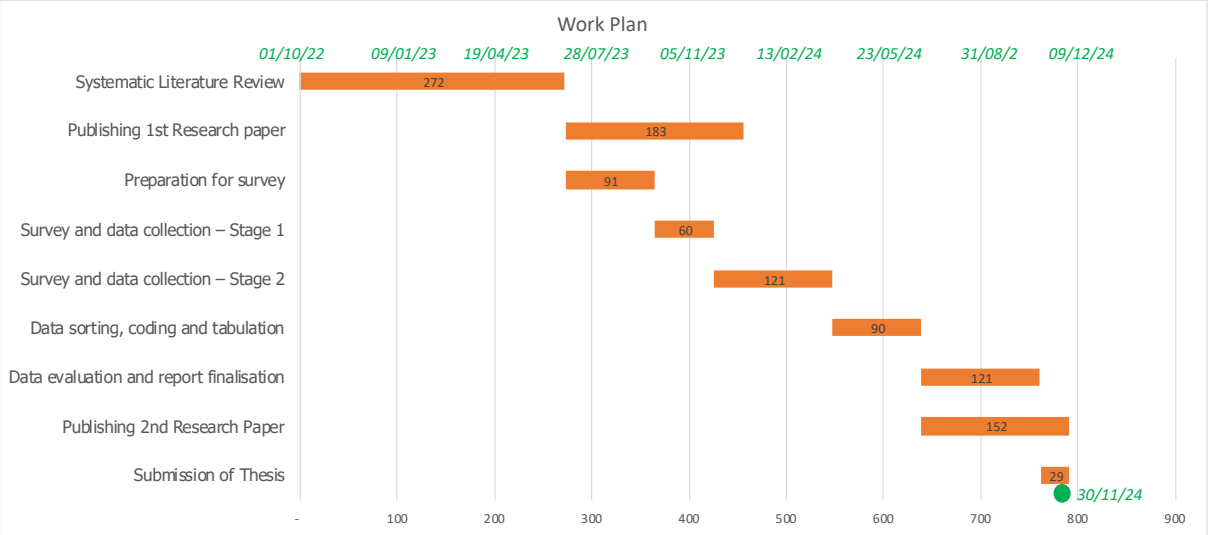
The likely limitations & delimitations of the study are as under;

1. It is proposed to adopt non-probability judgement sampling given that there is no formal & reliable sampling frame. Further, snowball sampling techniques shall also be adopted where required. There is a possibility of research bias, given that probability sampling is not used.
2. An estimated 200 executives are likely to be interviewed and to find such a quantum of executives having a minimum of 10 years of experience in the development of one or more ITOB projects in India and having been involved in the ITOB project from execution management at the senior position, shall be a challenging task within the limited time frame.
3. Further, an executive having ten years of experience and having executed at least one ITOB project in India in a senior position, at times, may not have 360-degree expertise in all aspects of the project, as we are not sure of the role played by them in the project execution.
4. With regard to the estimation of sampling size, Cochran's (1977) formula was used. The margin of error is the risk assumed or acceptable to the researcher, and for categorical data, a 5% margin of error is generally acceptable. However, the choice is for the researcher to increase this level, as per Bartlett et al. (2001). Relying on similar research by Ingle et al. l 2020 [42], a margin of error of 8% has been considered. This artificially reduces the number of samples required. However, Hair et al., in their book titled "Multivariate Data Analysis" 8th Edition (Page 770), explain that the advantage of PLS-SEM is that it can work well even on smaller sample sizes.
5. As we intend to adopt judgement sampling, the executives to be interviewed (samples) may not represent the whole of India. Given the country's cultural diversity, there is a possibility that the type of constraints/challenges faced in one region of India is not the same in the other regions.

10. The work plan of the research

The research is likely to be executed over the next two years, as under;

SN.	Activity	Start date	End date
1	Systematic Literature Review	1st October 2022	30th June 2023
2	Publishing 1st Research paper	1st July 2023	31st December 2023
3	Preparation for survey	1st July 2023	30th September 2023
4	Survey and data collection – Stage 1	1st October 2023	30th November 2023
5	Survey and data collection – Stage 2	1st December 2023	31st March 2024
6	Data sorting, coding and tabulation	1st April 2024	30th June 2024
7	Data evaluation and report finalisation	1st July 2024	30th October 2024
8	Publishing 2nd Research Paper	1st July 2024	30th November 2024
9	Submission of Thesis	1st November 2024	30th November 2024



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